# Numerical Modeling of Radiation Transport

Suite of codes optimizes design of experimental systems, reducing development costs

Numerical modeling provides rapid optimization and extremely accurate estimates of the actual performance of complex systems. The payoff is rapid system refinement at lower cost. LLNL has an excellent track record in developing reliable techniques to model the interaction of radiation—electrons, photons, and neutrons— with matter in complex experiments. We have developed an extensive suite of computer codes to model proposed experiments and investigate possible background interactions. These codes allow us to simulate complex, time-dependent radiation sources, model 3-D system geometries with real-world complexity, specify detailed elemental distributions (including compounds and isotopic mixes), and accurately predict the responses of many types of radiation detectors.
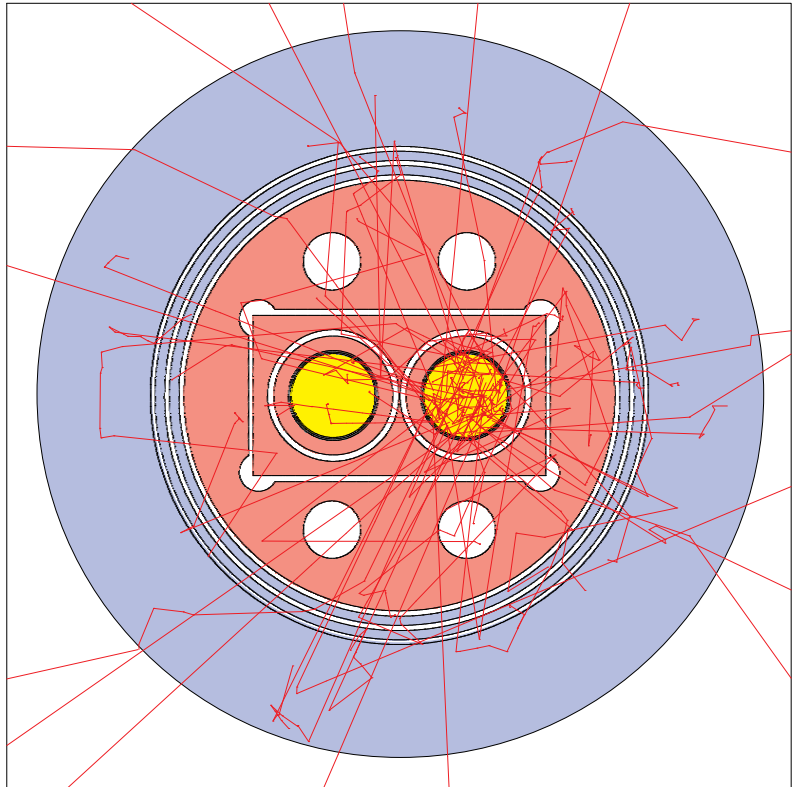
The COG code calcualted these trajectories of energetic gamma rays from the decay of one of two plutonium fuel pellets to estimate the effectiveness of gamma-ray shielding.

APPLICATIONS

- 3-D modeling of complex systems
- Experimental designs
- Neutron and photon imaging systems
- Radiaton dose rates
- Shielding schemes for radioactive materials
- Criticality studies
- Detection of contraband materials

Many applications

Recent applications include analyzing proposed laboratory experiments, evaluating neutron and photon imaging systems for use in nondestructive testing, estimating dose rates from radiation sources, evaluating schemes for shielding radioactive waste, designing reactor shields, carrying out criticality studies, prototyping radiation scanners for use in contraband detection, and designing detection schemes for use in stemming the spread of nuclear materials.

Availability: We are committed to making these numerical modeling capabilities available outside LLNL. The technology is available now.

Contact

James M. Hall
Phone: (510) 422-4468
Fax: (510) 422-9560
E-mail: jmhall@llnl.gov
Mail code: L-059